AMENDMENT TO THE CLAIMS

1. (canceled)

2. (currently amended) A method of processing all or a portion of a multi-dimensional signal with a domain composed of a collection of arbitrarily shaped domains via a multi-scale transform comprising the steps of:

    a. Obtaining a multi-dimensional digital image frame;

    b. Breaking the image frame into constituent arbitrary shaped domains, or given such a set, that cover all or a portion of the original multidimensional signal domain; and

    c. Performing a <u>combined</u> domain <u>and pattern</u> adaptive transform on one or more of the collection of arbitrary shaped domains, wherein ~~the domain adaptive transform comprises a transform in which~~ a filter comprising a convolution operator is applied to process ~~all pixels near a boundary of the domain but is not applied to process any pixels in an interior of the domain that are not near the boundary~~ pixels near a boundary of the domain, and wherein filter coefficients for an interpolation filter are scaled by an inverse of a gradient value.

3. (currently amended) A method of encoding all or a portion of a multi-dimensional signal with an arbitrarily shaped domain or all or a portion of a multi-dimensional signal via a multi-scale transform comprising the steps of:

    a. Obtaining the multi-dimensional signal;

    b. Performing ~~the domain~~ a combined domain and pattern adaptive transform on the signal, wherein ~~the domain adaptive transform comprises a transform in which~~ a filter comprising <u>a</u> convolution operator is applied to process ~~all pixels near a boundary of the domain but is not applied to process any pixels in an interior of the domain that are not near the boundary~~ pixels near a boundary of the domain, and wherein filter coefficients for an interpolation filter are scaled by an inverse of a gradient value;

    c. Quantizing resultant decomposition coefficients; and

    d. Encoding and transmitting quantized values over an information

channel to a decoder for reconstruction of an approximated signal.

4. (currently amended) A method of processing all or a portion of a multi-dimensional signal with a domain composed of a collection of arbitrarily shaped domains via a multi-scale transform comprising the steps of:

    a.   Obtaining a multi-dimensional digital image frame;

    b.   Breaking the image frame into constituent arbitrary shaped domains, or given such a set, that cover all or a portion of the original multidimensional signal domain;

    c.   Performing ~~the domain~~ a combined domain and pattern adaptive transform, wherein ~~the domain adaptive transform comprises a transform in which~~ a filter comprising a convolution operator is applied to process ~~all pixels near a boundary of the domain but is not applied to process any pixels in an interior of the domain that are not near the boundary~~ pixels near a boundary of the domain, and wherein filter coefficients for an interpolation filter are scaled by an inverse of a gradient value;

    d.   Quantizing resultant decomposition coefficients; and

    e.   Encoding and transmitting quantized values over an information channel to a decoder for reconstruction of an approximated signal.

5. (canceled)

6. (currently amended) The method of ~~claim 2 where step b comprises of a combined domain and pattern adaptive transform.~~ claim 2, wherein the interpolation filter comprises a set of the filter coefficients.

7. (currently amended) The method of ~~claim 3 where step b comprises of a combined domain and pattern adaptive transform.~~ claim 6, wherein the gradient value is computed for each filter coefficient from a center of the set of filter coefficients.

8. (currently amended) The method of ~~claim 4 where step c comprises of a combined domain and pattern adaptive transform.~~ claim 7, wherein the set of filter coefficients comprises a 4x4 set of filter coefficients.

9. (currently amended)   The method ~~as in claim 2 where instead of transmitting over an information channel the encoded data is placed~~ of claim 2, further comprising encoding quantized values and placing the encoded data onto a storage apparatus or mechanism for the purpose of efficient storage and later decoding.

10. (currently amended) The method ~~as in claim 3 where instead of directly quantizing the resultant decomposition coefficients and then encoding, the coefficients are passed~~ of claim 2, further comprising passing resultant decomposition coefficients through a bit-plane encoder.

11. (canceled)

12. (canceled)

13. (canceled)

14. (canceled)

15. (original) The method as in any one of claims 2 or 6 where the multi-dimensional image frame is a still image frame.

16. (original) The method as in any one of claims 2 or 6 where the multi-dimensional image frame is an infra-frame for a sequence of video images.

17. (original) The method as in any one of claims 2 or 6 where the multi-dimensional image frame is a residue frame for a sequence of video images.

18. (currently amended) The method as in claim 6 where the <u>combined</u> domain <u>and pattern</u> adaptive transform is applied during the calculation of coarser scale representations in a forward transform of a multi-scale transform.

19. (currently amended) The method as in claim 6 where the <u>combined</u> domain <u>and pattern</u> adaptive transform is applied during the estimation of next finer scale representations in an inverse transform of a multi-scale transform during the reconstruction phase either in conjunction with or irrespective of the use of the method in claim 18.

20. (currently amended) The method as in claim 6 where the <u>combined</u> domain <u>and pattern</u> adaptive transform is applied in order to construct a sub-band decomposition of a multi-scale transform.

21. (canceled)

22. (canceled)

23. (currently amended) The method as in claim 6 where the <u>combined</u> domain <u>and pattern</u> adaptive transform is applied during the estimation of the next finer level of sub-bands in a multi-scale transform during a reconstruction phase.

24. (original) The methods of claims 19 or 23 where the domain adaptive transform is applied either with or without the presence of quantization or bit-plane pruning.

25. (previously presented) The method as in claim 6 where the domain adaptive transform is applied such that the points external to the arbitrary domain but within support of a filter (or filters) are excluded from a mathematical result of a convolution or weighted average / difference.

26. (previously presented) The method as in claim 6 where the domain adaptive transform is applied such that points external to the arbitrarily shaped domain but within support of the filter (or filters) are included in a mathematical result of a convolution or weighted average / difference but are further multiplied (or re-weighted) by another set of weighting factors.

27. (previously presented) The method of claim 26 where the set of additional multiplicative factors is determined as a result of calculation of a local measure characterizing a transition at a boundary of the arbitrary domain.

28. (previously presented) The method of claim 27 where the measure is based on a statistical function of a plurality of pixel value differences across the boundary transition.

29. (original) The method of claim 28 where the statistical function is the mean.

30. (original) The method of claim 28 where the statistical function is the median.

31. (original) The method of claim 28 where the statistical function is based on a weighted average.

32. (previously presented) The method of claim 28 where the statistical function is based on a weighted average with coefficients that are nonlinear functions of pixel values

33. (previously presented) The method of claim 28 where the statistical function is a pre-determined constant.

34. (previously presented) The method of claim 26 where the set of additional multiplicative factors is determined as a result of calculation of a local measure characterizing a transition at the boundary of the arbitrarily shaped domain and the calculation of the local measure is dependent on data which is available to a decoder at the time of an operation when envisioned as part of an inverse transform or reconstruction phase of a multi-scale transform.

35. (original) The method of claim 34 where the calculation of the local measure is based on one or more coarser scales of representation of the signal which have already been

decoded and thus made known to the decoder by the time of the inverse transform step.

36. (original) The method of claim 34 where the calculation of the local measure is based on a motion compensated model frame (or equivalent) that has already been decoded and thus made known to the decoder by the time of the inverse transform step in the context of a encoder-decoder system related to the efficient transmission or storage of a sequence of video data.

37. (previously presented) The method as in any one of claims 25 or 26 where a function for renormalization, i.e. replacement of the missing filter coefficients, is accomplished by a statistical function of remaining pixel values which are located at points contained within the arbitrary shaped domain.

38. (original) The method of claim 37 where the statistical function is based on the median.

39. (original) The method of claim 37 where the statistical function is a mean.

40. (original) The method of claim 37 where the statistical function is a weighted average.

41. (original) The method of claim 40 where the statistical function is a weighted average with coefficients that are nonlinear functions of the data values themselves.

42. (original) The method of claim 37 where some form of outlier rejection is used to ensure that outliers remaining inside the intersection of the domain and the filter support do not disrupt the local accuracy or efficiency of the transform.